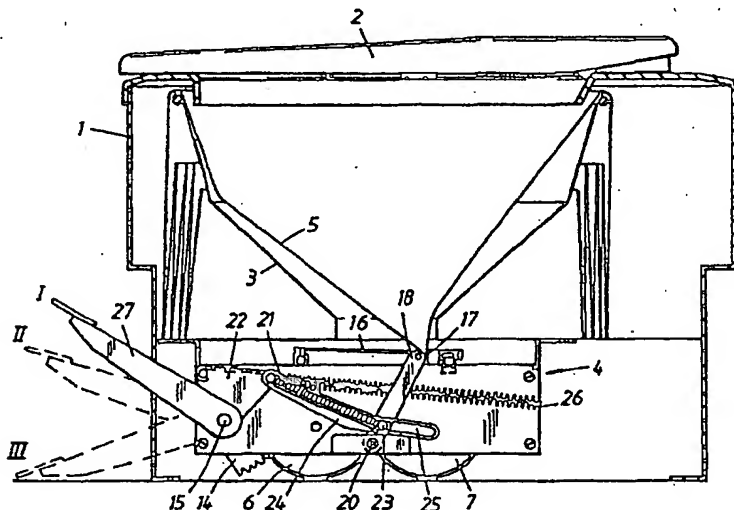




## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(21) International Application Number: PCT/SE96/00580 (22) International Filing Date: 3 May 1996 (03.05.96) (30) Priority Data: 9501685-3 5 May 1995 (05.05.95) SE (71) Applicant (for all designated States except US): DANFO SANITETSYSTEM AB [SE/SE]; P.O. Box 103, S-713 23 Nora (SE). (72) Inventor; and (75) Inventor/Applicant (for US only): FORSLUND, Göran [SE/SE]; Hjortstigen 4, S-713 33 Nora (SE). (74) Agent: NORÉNS PATENTBYRÅ AB; P.O. Box 10198, S-100 55 Stockholm (SE).			(81) Designated States: AL, AM, AT, AU, AZ, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).  Published With international search report. In English translation (filed in Swedish).

(54) Title: AN ARRANGEMENT FOR HANDLING AND TEMPORARILY STORING WASTE



## (57) Abstract

The present invention relates to an arrangement for handling and temporarily storing waste in a flexible hose (5), wherein the arrangement includes closure devices (16, 17) which in a closed state sealingly compress or pinch the hose so that the hose part which is located beneath the closure devices will form a sealed container, hose downfeed means (6-9) which advance the hose successively past the hose closure devices, and means (10-15, 18-27) for manoeuvring the downfeed means and the closure devices, wherein the manoeuvring devices are so constructed to prevent actuation of the downfeed means unless the closure are located in or are simultaneously moved to an open position. According to the invention, the manoeuvring devices (10-15, 18-27) are arranged to disable the downfeed means as the closure devices (16, 17) are moved from an open to a closed position and the closure devices can be moved to a closed position irrespective of the length of hose that is advanced by the downfeed means (6-9) past the closure devices. The present invention also relates to a dry toilet in which the arrangement is used. The casing of the dry toilet comprises two telescopic parts.

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## AN ARRANGEMENT FOR HANDLING AND TEMPORARILY STORING WASTE

The present invention relates to an arrangement for handling and temporarily storing waste in a flexible tube or hose, comprising hose-closure devices which when closed squeeze the hose sealingly together so that the hose part that is located beneath the closure devices will form a sealed container, downfeed devices which function to feed the hose successively past the closure devices, and means for operating the downfeed means and the closure means, wherein the operating means are constructed to prevent activation of the downfeed means unless the closure means are located in or simultaneously moved to an open position. The invention is primarily intended for use with dry toilets although it can, of course, be used in conjunction with other apparatus in which waste or the like is deposited intermittently in a hose or tube.

An example of such a device is disclosed in SE-B-381 172. This earlier publication describes a dry toilet which includes downfeed wheels which coact with closure means in the form of welding jaws. The welding jaws coact with the downfeed wheels in a manner which prevents the hose from being closed until the wheels have rotated through one complete revolution. This means that a certain length of hose is consumed each time the welding jaws are opened, irrespective of the volume of waste that is delivered to the lower, receiving part of the hose. Consequently, the storage capacity of the hose is not utilized to a maximum, which results in relatively high material costs when using the known toilet. Furthermore, the hose in such an arrangement often needs replacing, therewith making handling costs higher than necessary. Another drawback with this known device is that objects which fasten between the welding jaws and prevent the jaws from being fully closed result in malfunction.

The object of the present invention is to eliminate these drawbacks.

5 This object is achieved by means of an arrangement of the kind defined in the introduction, which is characterized in that the operating means are constructed so that the downfeed means will be inactivated or disabled while moving the closure devices from their open position to their closed position; and in that the closure devices can be moved to  
10 their closed states irrespective of the length of hose that is fed past the closure devices by the downfeed means. Because the downfeed means are disabled during closure of the closure devices, it can be ensured that no breakdown or malfunctioning will take place should an object prevent the  
15 closure devices from being brought to a fully closed state. Furthermore, because the closure devices can be brought to a closed state without downfeeding a given length of hose, hose consumption can be minimized and therewith lower the cost of using the arrangement. The handling costs are also  
20 reduced, since it is not necessary to change the hose as often as in the case of the known arrangement.

In one preferred embodiment of the invention, the operating means includes a manoeuvring shaft which is common to both  
25 the closure devices and the downfeed means. The manoeuvring shaft is reciprocatingly pivotable between a starting position, an intermediate position and a final position, wherein the downfeed means are arranged to be activated solely by rotation of the manoeuvring shaft in one direc-  
30 tion. Furthermore, the mechanism which manoeuvres the closure devices is designed so that movement of the closure devices between their respective closed and open states is achieved by rotating the manoeuvring shaft between said starting position and said intermediate position, and the shaft is  
35 arranged to be rotated to the starting position automatically in the absence of external loads or forces. The hose downfeed means have the form of two pairs of downfeed wheels, wherein

the two wheels of each wheel pair are mounted in the same plane with their peripheries adjacent one another and with a part of the hose held firmly in the nip between the wheels of each pair, and a pendulum arm is provided for rotating the manoeuvring shaft. In its closed state, the closure device is pressed against a counter-pressure surface or anvil surface.

The invention will now be described with reference to the accompanying drawings, in which

Fig. 1 is a partially cut-away side view of a dry toilet which includes an embodiment of an inventive device;

Fig. 2 is a horizontal sectional view of the toilet shown in Figure 1;

Figs. 3-5 are partially cut-away side views of a bottom part of the toilet shown in Figures 1 and 2, and show the inventive arrangement in a starting position, an intermediate position and a final position respectively, and also show a manoeuvring shaft forming part of the arrangement;

Figs. 6 and 7 are side views of one embodiment of a dry toilet and show respectively the toilet in a storage state and a use state;

Fig. 8 is a perspective view of the telescopically collapsible casing of the toilet shown in Figures 6 and 7; and

Fig. 9 illustrates a toilet insert fitted in a casing according to Figure 8.

The dry toilet illustrated in Figures 1-5 includes a casing 1 which carries conventionally a toilet seat and seat cover 2. A funnel-shaped toilet insert 3 having a comparatively large upper opening and a lower smaller opening is fitted

between the toilet seat and an inventive hose-closing and hose-feeding mechanism 4. A hose 5 of flexible material, e.g. flexible plastic material, extends over the edge of the upper insert opening and passes down through the bottom insert opening and the mechanism 4 and into a storage space (not shown). As shown in Figure 1, that part of the hose 5 which lies outwardly of the toilet insert 3 is folded to a bellows-like configuration.

The hose-feeding and hose-closing mechanism includes two pairs of downfeed wheels 6, 7 and 8, 9 which are mounted diametrically opposite one another and outwardly of an imaginary vertical downward extension of the edges of the bottom insert opening. The wheels 6, 7 and 8, 9 of each wheel pair are located in the same vertical planes sequentially of one another, and the peripheries of the wheels of each wheel pair are at least almost in abutment with one another. The mutually opposing wheels 6, 8 and 7, 9 of the two wheel pairs are mutually connected by a respective common shaft 10 and 11 respectively. As will be seen from Figure 3, a gear wheel 12 is connected to the shaft 10 through the medium of an appropriate freewheel clutch, such that the gear wheel 12 is able to rotate freely in relation to the shaft 10 in an anti-clockwise direction as seen in the Figures. The teeth of the gear wheel 12 mesh with teeth on an arcuate toothed link 14. The link 14 is non-rotatably mounted on a manoeuvring shaft 15. As the manoeuvring shaft is rotated in an anti-clockwise direction (as seen in the Figures), the gear wheel 12 will turn the shaft 10 and therewith the wheels 6 and 8 in a clockwise direction, whereas clockwise rotation of the manoeuvring shaft will have no affect on the shaft 10.

The manoeuvring shaft 15 also functions to manoeuvre a flap 16 through the medium of a link mechanism, between a closed position in which the right side-edge of the flap (Figures 1 and 3) lies against a sealing strip 17, as shown in said Figures, and an open position in which the right side-edge

is distanced from the bottom insert opening, as shown in Figures 4 and 5. The free end of a pivotal arm 18, 19 is pivotally attached to each end of the flap side-edge. As will best be seen from Figures 1 and 4-5, the arm 18 is pivotal about a pivot point 20. A pull spring 21 extends between a triangular link 22, one of which is fixedly mounted on the manoeuvring shaft 15, and a pin 23 which projects out from the arm 18 and which is located at a much shorter distance from the pivot pin 20 of the arm than from the end that is connected to the flap. As the manoeuvring shaft 15 is rotated anti-clockwise, the arm 18 will swing from the position shown in Figure 1 to the position shown in Figure 4. One end of a pressure arm 24 is pivotally connected to the triangular link 22 at the same point as the spring 21, while its opposite end-part is slidably supported by the pin 23 on the arm 18 through the medium of a slot 25 provided at the end of the pressure arm 24. The triangular link 22 is biased towards its position shown in Figure 1 by means of a spring 26. The arm 19 opposite the arm 18 is actuated by a similar link mechanism as that described above with reference to the arm 18, and the arms 18 and 19 will therefore swing synchronously as the manoeuvring shaft 15 is rotated. The manoeuvring shaft 15 is rotated anti-clockwise by pressing down or tramping on a pedal arm 27 which is non-rotatably connected to the manoeuvring shaft.

The hose-feeding and hose-closing mechanism 4 has the form of a module or unit which is attached to the toilet casing 1 with all component parts already fitted to the casing of the module, possibly with the exception of the pedal arm.

The modus operandi of the dry toilet illustrated in Figures 1-5 will now be described with a starting point from the state of the toilet shown in Figures 1 and 3.

In the initial state, or starting state I of the toilet, the hose 5 is closed-off by virtue of a part of the hose being

compressed or pinched between the left side-edge of the flap 16 and the sealing strip 17. Opposing side-parts of the hose 5 are held firmly in the nip between the downfeeding wheels 6, 7, see Figure 2 and Figures 8, 9 respectively. If it is desired to empty the toilet basin after using the toilet, i.e. to empty that part of the hose 5 which is located within the funnel-shaped insert 3, the pedal arm 27 is pushed down with the aid of a foot.

When pushing the pedal arm from the position shown in Figure 3 to the position shown in full lines in Figure 4, the manoeuvring shaft 15 is rotated, and therewith also the triangular link 22. Rotation of the triangular link results in tensioning of the spring 26 and also causes the spring 21 and the pressure arm 24 to be moved to the left in the Figures. Movement of the spring 21 results in pivoting of the arm 18, so as to move the flap 16 to the left in the Figures. When pressing the pedal arm 27 down from the starting position shown in Figure 3 to the intermediate position II in Figure 4, the flap 16 will move from a fully closed to a fully open position. It will be noted that the flap 16 is so easily moved on its journal bearing that the spring 21 is able to move the flap between its closed and its open position without being stretched. Furthermore, the extension of the flap is suitably so large in the direction of movement that the left side-edge (as seen in Figures 1 and Figures 3-5) reaches a wall of the toilet casing 1 when the flap is in its open position. As the triangular link 22 is rotated, the link 14 that actuates the gear wheel 12 is also rotated therewith causing the downfeed wheels to rotate so as to advance a small length of hose from the toilet basin. Thus, when the flap 16 has been moved to its open position all waste present in the toilet basin is able to fall down into the hose-collecting space 28 beneath the mechanism 4.

Figure 5 shows the pedal arm moved to its final position III. As the pedal arm is pushed down from the intermediate



position II to the final position III, further rotation of the triangular links 22 and the toothed link 14 takes place. This further rotation of the toothed link 14 causes a further portion of the hose 5 to be fed into the collecting space 28, while said further rotation of the triangular links causes the pressure link 24 to move further to the left, this movement being controlled by the pin 23 and the slot 25 and by an extension of the spring 21. The flap 16 does not move when the pedal arm 27 is pressed down between the positions II and III.

When the pedal arm is released in position III, it is automatically returned to the starting position I by the springs 21, 26. Because the shaft 10 carrying the hose downfeed wheels 6 and 8 are connected to the gear wheel 12 by means of a freewheel clutch, the gear wheel 12 will rotate freely in relation to the shaft 10 as the manoeuvring shaft 15 is rotated clockwise, and the downfeed wheels will therefore be stationary when the pedal arm returns from its final position to its starting position. As the pedal arm 27 swings between the positions III and II, the springs 21, 26 act to rotate the triangular links 22 and therewith the manoeuvring shaft 15. When the pedal arm has reached the position II, the spring 21 has contracted to a relaxed state and the pressure arm 24 has moved relative to the pin 23 at the same time, so as to rest against the inner end of the slot 25 as shown in the Figures. The spring 26 is solely responsible for movement of the pedal arm between the positions II and I. As the pedal arm moves, the pressure arm 24 is moved to the right and carries with it the pin 23, and therewith the arm 18, so as to move the flaps 16 from its open to its closed position. The spring 26 is suitably biased so that when the flap 16 is in its closed position, the flap will press against the strip 17 with a determined force.

The aforescribed dry toilet has many advantages over

earlier known toilets of a similar kind, particularly with regard to optimal use of the hose. When only a small amount of waste is to be emptied from the toilet basin, for instance when the waste consists only of liquid, it may suffice to press the pedal arm only from the starting position I to the intermediate position II in order for all waste to fall down into the collecting chamber, therewith using only a small length of hose. Furthermore, downfeed of the hose can be interrupted at any time without jeopardizing the hose-closing function, therewith enabling downfeed of the hose to be interrupted immediately the toilet basin is emptied. This is a significant advantage over earlier known toilets, in which the hose-closing function is coupled with the downfeed of a given hose length. A desired length of hose can be fed down through the funnel-shaped insert by repeatedly moving the pedal arm of the aforescribed toilet between the positions II and III without returning to position I and without the closure flap leaving its open position. The intermediate position II can be made readily discernable by a user of the aforescribed toilet, by appropriate adaptation of the spring characteristics of the springs 21 and 26.

Another advantage afforded by the inventive toilet is that if an article should fasten between the closure flap 16 and the sealing strip 17 such as to prevent the flap from closing completely, neither the closure manoeuver nor the downfeed manoeuver will be blocked and all that happens is that the manoeuvring shaft and the manoeuvring mechanisms cannot return to their starting positions. In the case of the illustrated embodiment, there is small risk that a fold or the like in the hose will fasten in the manoeuvring mechanism. The arrangement is also operated manually. In combination, the inventive toilet is therefore very reliable in operation.

Figures 6-8 illustrate a second embodiment of a toilet casing 1 in accordance with the invention. This casing comprises

two telescopic parts 30, 31 which can be brought from a packaged state in which said parts are telescoped one into the other, as shown in Figure 7, to a position of use in which the parts are extended and fixed relative to one another, as shown in Figure 6. The parts 30, 31 are fixed relative to one another in the use state of the toilet, with the aid of latch means 32 which are pivotally mounted to the casing part 30 and which swing automatically from a horizontal to a vertical position as the casing part 30 is lifted up from the casing part 31. Figure 8 also illustrates a toilet insert 33-37 which is suitable for use in combination with the casing 1' and which is shown in a stow-away or storage state in Figure 8. As will clearly be seen from Figure 9, the insert of this embodiment is comprised of a wire ring 33, two U-shaped wire stirrups 34, 35 and two upstanding attachment plates 36, 37 which are attached to the casing part 31. The legs 38, 39 and 40, 41 of respective U-shaped stirrups 34, 35 diverge slightly in relation to the base 42, 43 of respective U-shaped devices, said base having a V-shape with an obtuse angle between the legs of the V and also slopes outwards in relation to the plane of its associated base 42, 43 at an angle  $\alpha$ , which is shown in Figure 9 for the leg 38. The U-shaped devices 34, 35 are pivotally attached to the attachment plates 36, 37 so as to be able to swing between a storage position, shown in full lines in Figure 8, and in chain lines in Figure 9, and a use position shown in full lines in Figure 9. When the toilet is in its use state, the bases 42, 43 of the U-shaped devices rest on a false bottom 44 of the casing part 31. The extremities of the legs 38-41 of the U-shaped devices are inclined to the remainder of the legs, so as to extend generally vertically in the use position and are received in downwardly facing sockets on the ring 33. The distance between the upstanding ends of two mutually opposing legs 38, 40 and 39, 41 respectively is slightly less than the distance between the sockets on the ring 33 into which said ends shall be fitted, thereby making it necessary to bend the legs slightly upwards

when fitting the legs onto the ring. When the ring 33 is fitted into place, the bases 42, 43 will be urged against the bottom 44 by a spring force, therewith causing the wire insert to stand firmly on said bottom. Naturally, a casing and a wire insert of this kind can also be used conveniently together with the aforescribed hose feeding and closing mechanism.

It will be understood that the aforescribed embodiment can be modified in several ways within the scope of the invention. For instance, the closure device may have the form of a sealing strip instead of the flap 16, and the manoeuvring shaft 15 may be connected to the arcuate tooth link 14 such that the link will solely be actuated by rotation of the manoeuvring shaft between the positions II and III. The spring 26 may also be replaced with a torsion spring which acts directly on the manoeuvring shaft. The invention is therefore restricted solely by the content of the following Claims.

## CLAIMS

1. An arrangement for recovering and temporarily storing waste in a flexible hose (5), wherein the arrangement includes closure devices (16, 17) which in a closed state sealingly compress the hose together so that the hose part located beneath the closure devices will form a sealed container, hose downfeed means (6-9) for feeding the hose successively past the hose closure devices, and means (10-15, 18-27) for manoeuvring the downfeed means and closure devices, wherein the manoeuvring means are constructed so as to prevent actuation of the downfeed means unless the closure devices are located in or are simultaneously moved to an open position, characterized in that the manoeuvring means (10-15, 18-27) are arranged to disable the downfeeding devices as the closure devices (16, 17) are moved from an open to a closed position; and in that the closure devices can be moved to a closed position irrespective of the length of hose that is advanced by the downfeed means (6-9) past the closure devices.

2. An arrangement according to Claim 1, characterized in that the manoeuvring means (10-15, 18-27) include a manoeuvring shaft (15) which is common in manoeuvring the closure devices (16, 17) and the downfeed means (6-9) and which can be rotated reciprocatingly between a starting position (I), an intermediate position (II) and a final position (III), wherein the downfeed means are arranged to be actuated solely by rotation of the manoeuvring shaft in one direction.

3. An arrangement according to Claim 2, characterized in that the closure device manoeuvring means or mechanism (15, 18-27) is constructed so that movement of the closure devices between a closed and an open position is achieved by rotation of the manoeuvring shaft between said starting and intermediate positions (I and II respectively).

4. An arrangement according to Claim 2 or Claim 3, characterized in that the manoeuvring shaft (15) is arranged to be rotated automatically to the starting position (I) in the absence of external loads.

5

5. An arrangement according to any one of Claims 1-4, characterized in that the hose downfeed means (6-9) are comprised of two pairs of downfeed wheels, wherein the two downfeed wheels (6, 7 and 8, 9) of each wheel pair are located in the same plane with the peripheries of said wheels lying adjacent one another and with a part of the hose (5) firmly gripped in the nip between the wheels of each wheel pair.

10

15 6. An arrangement according to any one of Claims 2-5, characterized by a pedal arm (27) which functions to rotate the manoeuvring shaft (15).

20

7. An arrangement according to any one of Claims 2-6, characterized in that the closure devices (16) are pressed against a counter-pressure surface (17) by a spring force in the closed position of said closure devices.

25

8. A dry toilet comprising a device for handling and temporarily storing waste in a flexible hose, comprising closure devices which when in a closed position sealingly compress or pinch the hose so that the hose part which is located beneath the closure devices forms a sealed container, hose downfeed means which advance the hose successively past the closure means, and devices for manoeuvring the downfeed means and the closure devices, wherein the manoeuvring means are constructed to prevent activation of the hose downfeed means unless the closure devices are in or are simultaneously moved to an open position, and a casing (1') which surrounds and supports the arrangement and the hose, characterized in that the casing (1') is comprised of two telescopic parts (30, 31).

35

9. A dry toilet according to Claim 8, characterized by fixing devices (32) which automatically secure the casing parts (30, 31) relative to one another when the casing (1') is extended from a telescoped state.

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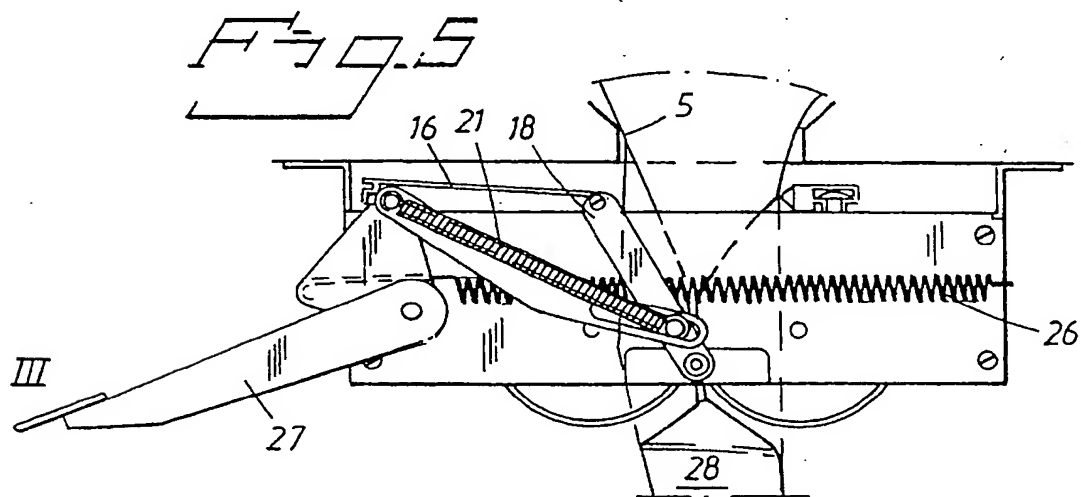
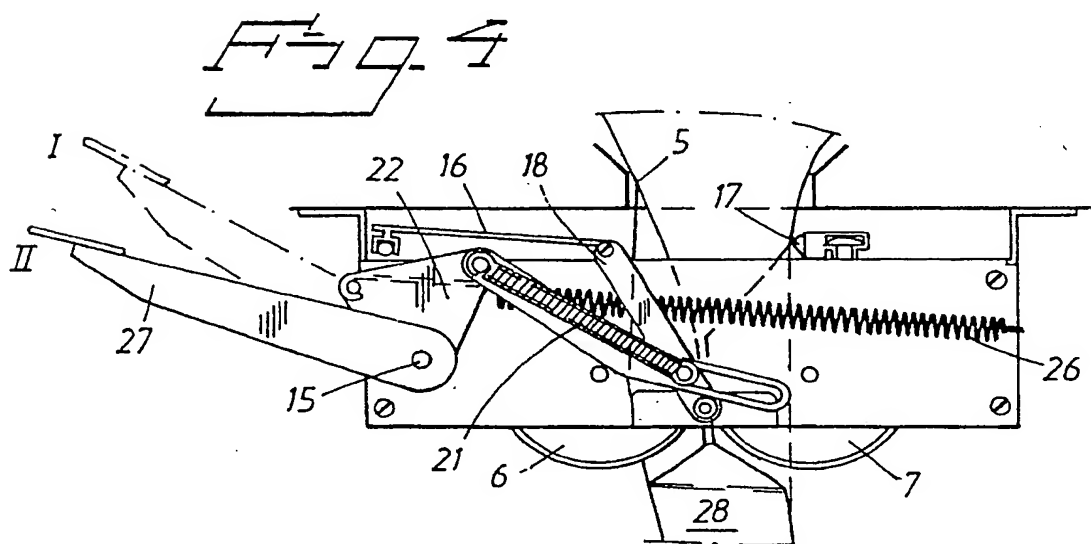
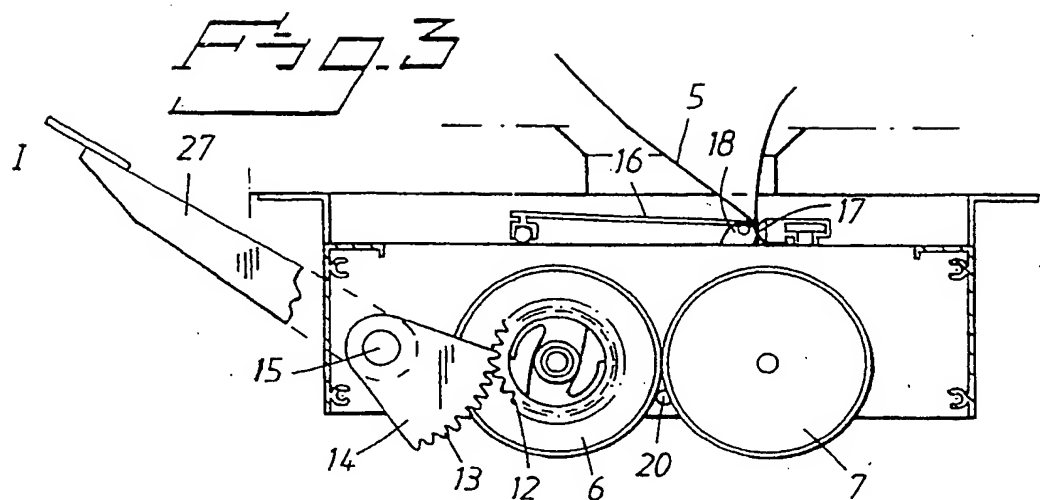
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10. A dry toilet according to Claim 8 or Claim 9, characterized by a toilet insert (33-35) which includes two generally U-shaped wire stirrups (34, 35) which can be swung from a storage position, in which they lie in a plane perpendicular to the direction in which the casing part (30, 31) telescope, to a use position in which they project up from said plane, and a wire ring (33) which includes means for its attachment to the free ends of the U-shaped wire stirrups (34, 35) in their use position.

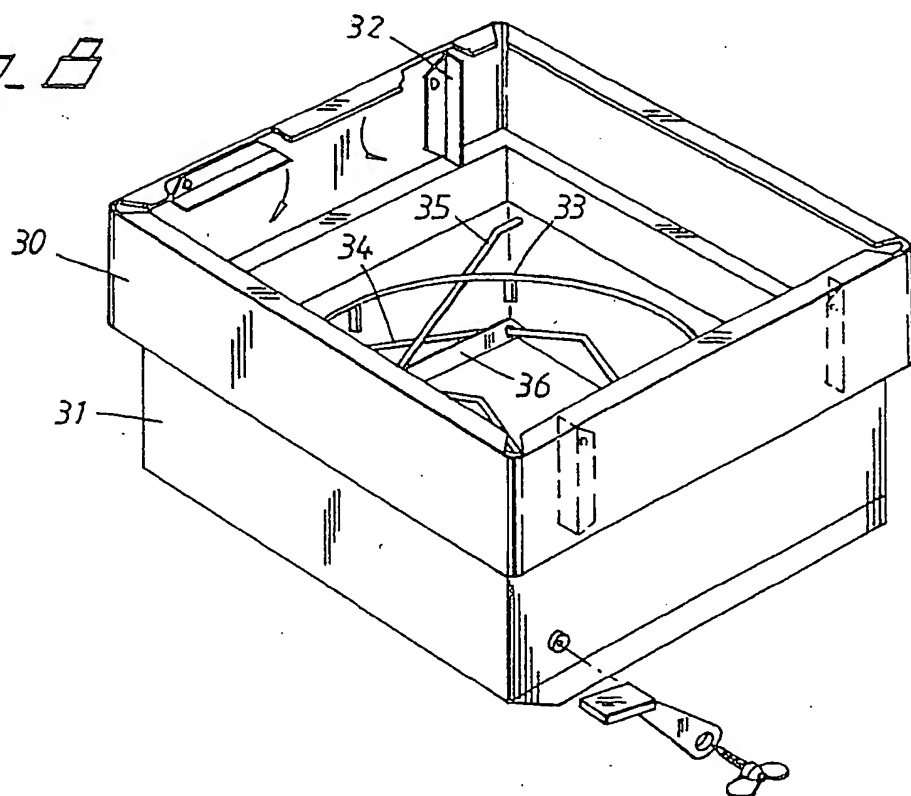
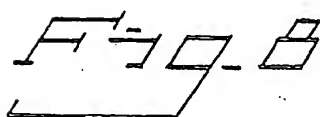
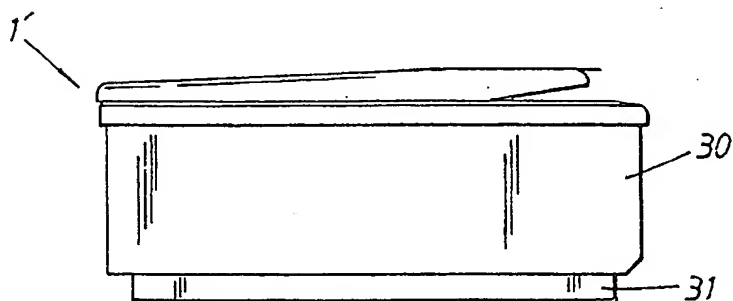
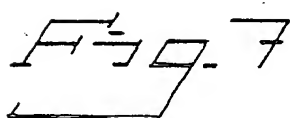
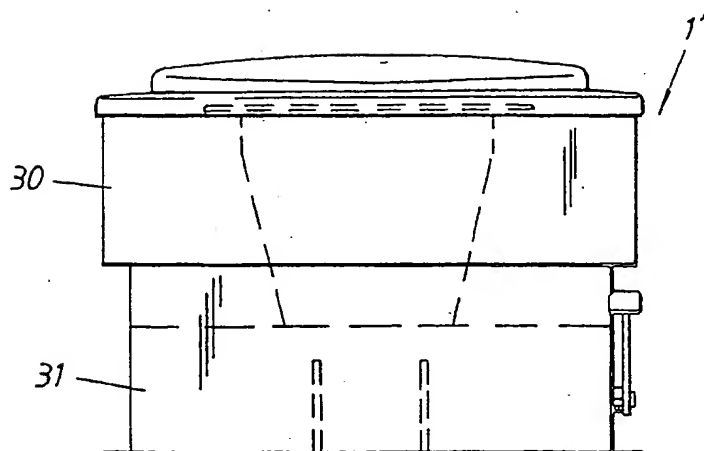
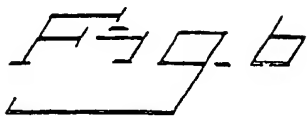




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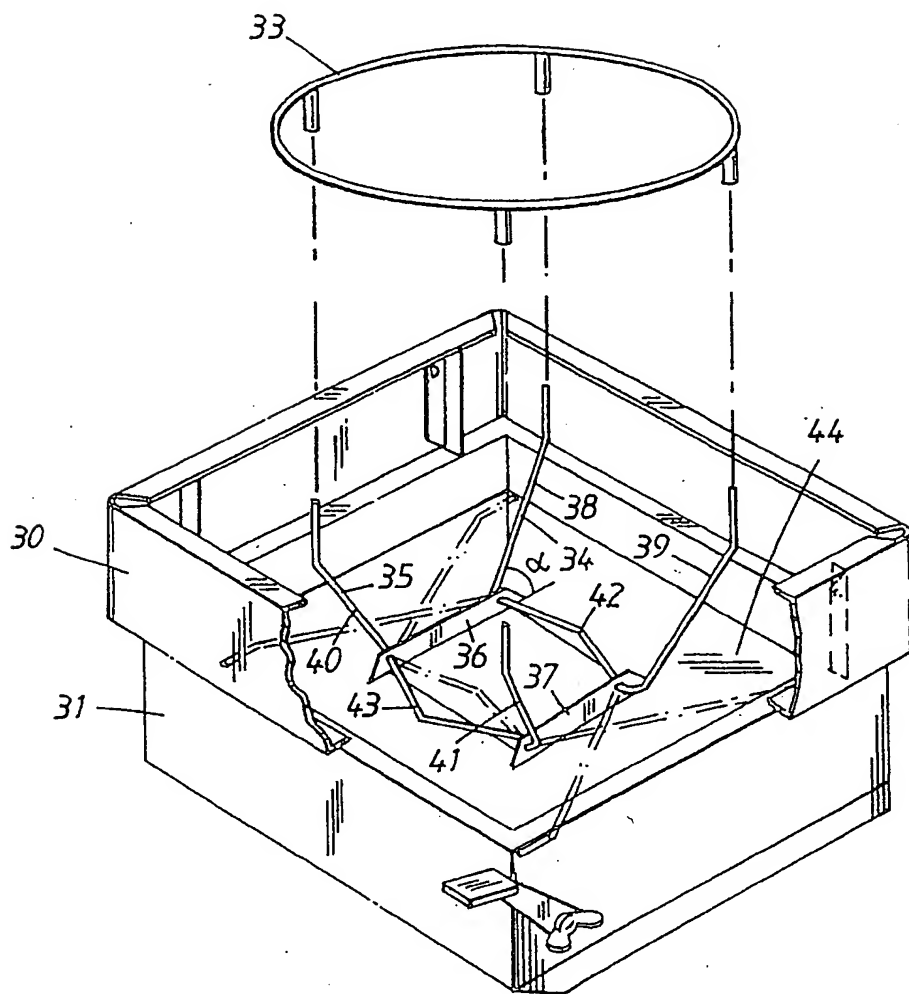


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Fig. 4



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 96/00580

## A. CLASSIFICATION OF SUBJECT MATTER

IPC6: A47K 11/02, B65F 1/06, B65B 9/15

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: A47K, B65B, B65F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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QUESTEL: WPIL

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	DE 1920978 A (COUPER, JOHN ROY), 5 November 1970 (05.11.70), page 4 --	8
X	US 3693193 A (R.L. MAY), 26 Sept 1972 (26.09.72), column 4, line 21 - column 5, line 25, figures 4,6	1
Y		8
A		2-7,9,10
A	GB 2160417 A (NORTHERN SPECIALISED SITE SERVICES LIMITED (UNITED KINGDOM)), 24 December 1985 (24.12.85), page 1, line 9 - line 16; page 2, line 67 - line 72 -- -----	1-7



Further documents are listed in the continuation of Box C.



See patent family annex.

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INTERNATIONAL SEARCH REPORT  
Information on patent family members

01/07/96

International application No.  
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Patent document cited in search report		Publication date	Patent family member(s)		Publication date
DE-A-	1920978	05/11/70	NONE		
US-A-	3693193	26/09/72	CA-A-	937351	27/11/73
GB-A-	2160417	24/12/85	NONE		